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THE FISHES
OF THE
FAMILY SPHYRAENIDAE
IN THE
WESTERN INDIAN OCEAN

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By

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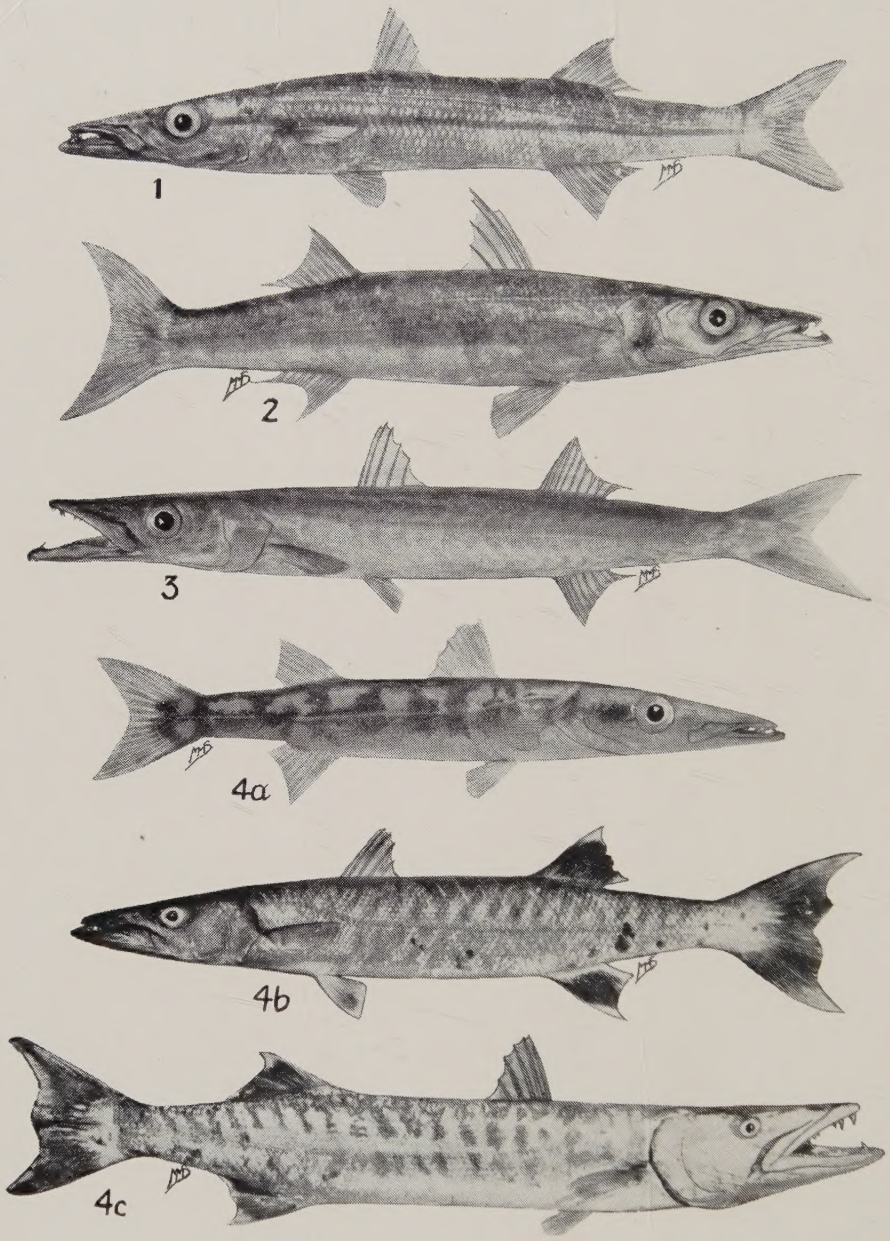

PLATE I.

Total lengths stated.

1.—Sphyraenella flavicauda, 310mm. **2.—Sphyraenella chrysotaenia,** 250mm.

3.—Indosphyraena africana, 230mm.

4a—Agrioposphyraena barracuda, 70mm ; b. 660mm ; c. 1525mm.

ACKNOWLEDGEMENTS

The main funds which made possible the extensive travelling necessary for adequate investigation of these wide-ranging fishes came from the South African Council for Scientific and Industrial Research.

We acknowledge also extensive facilities and assistance received in the Western Indian Ocean from the authorities of Mozambique, Tanganyika, Kenya, Zanzibar, Pemba, Seychelles and all islands, excepting French territories, there.

I am indebted to my wife, Margaret Mary Smith, for the illustrations.

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The Fishes of the Family Sphyraenidae in the Western Indian Ocean

(with Plates 1 & 2)

by **Professor J. L. B. Smith,**

S.A. Council for Scientific and Industrial Research Fellow in Ichthyology,
Rhodes University, Grahamstown, South Africa.

ALTHOUGH the Sphyraenidae occur in all warm seas, there are probably less than twenty valid species, about twelve in the Indo-Pacific, one of which occurs in the Atlantic as well. The larger species are in most parts more of angling than commercial significance, but some of the smaller at times occur in great shoals in shallow water where they may be netted. The Sphyraenidae are of some importance as food, the flesh of all species being delicate and well flavoured. In some parts there have been reliable reports that the flesh of certain species may cause acute poisoning, but we found no evidence of this in the Western Indian Ocean. As may be deduced from the torpedo-like body and the huge mouth with formidable sabre-like teeth, the large species are fierce predators and much feared as they move with great speed and do not hesitate to attack man. They are not generally ranked very high as game fishes, for most are taken on heavy tackle put out for larger types such as Tunny and so are easily subdued. In South African seas only few species are known, and only rarely below about 32°S. They are a not uncommon catch in Natal waters, where they are known as "Sea Pike."

Beyond the description of forms believed new and a few regional surveys, little work has been done on these fishes. The only general surveys appear to be those of Gunther 1860, Weber and de Beaufort 1922, and a synoptic revision by Schultz 1953, the latter based mainly on descriptions by others. This, while most helpful, is, as Schultz warns, to be used with caution, as he had only restricted material, and some of his conclusions are in consequence doubtful.

The larger Sphyraenids in particular are swift roving fishes of open water, rarely abundant in any area and by no means easy to capture, most being taken by moving lures. As a result it is not only difficult to assess populations and migrations, but numbers are rarely available for examination, even in the field, and as most species occur in the tropics, the preservation of large specimens is a serious problem. These fishes are by no means uncommon in the Western Indian Ocean and during a number of exploratory voyages in the tropical area we secured a number of specimens. At least ten species occur there.

Partly because of the wide range covered by these fishes, both small and large, and partly because quite considerable growth changes have apparently not been recognised, there has been considerable confusion which can be resolved only by the study of adequate material. In the young of most species the head is relatively larger than in the adult, and as shown below in some cases the relative points of insertions of the fins change progressively from the young to the adult stage. The hindward extent of the maxilla appears to increase with age, and there is the normal relative decrease of eye and increase of interorbital. In some cases the pectoral appears to increase and the pelvic to decrease in relative length with age. We find that in the young of most species the teeth on the side of the lower jaw are bent strongly backwards and that this becomes progressively less with age.

Most workers hitherto have been content to lump all species in the single genus **Sphyraena** Walbaum, 1792. Brief field study alone makes it clear that there are several distinct lines of cleavage, notably between the small forms which live almost entirely in shallow water close to land, and the larger and fiercer predators which roam widely even in the open ocean. The small species are further differentiated by all having at least one long normal gillraker, and most have a naked skinny flap at the corner of the preopercle, neither of these features present in the larger forms. In the past fifty years only two genera other than **Sphyraena** have been proposed, and both have been ruthlessly pushed into the "catch-all" bag of **Sphyraena** by other workers. There, however, appears to be clear cut generic cleavage among the species of the Western Indian Ocean at least and the ten listed are placed in six genera as defined below.

As I have noted in many other cases, the older names which many of the species have borne have been quite arbitrary. In the absence of types names had been allocated on guesses as to what species the original author really had. In some cases, where two closely related forms are now recognised, the original description, while possibly of generic value, has none at specific rank. In all such cases I have discarded the old name and based the species on the first unambiguous description.

In the descriptions below, the length of the head is measured from the tip of the chin to the hindmost point of the head : The eye is the part not covered by the adipose lid : the lateral line count is taken to the base of the caudal. Literature is summarised at the end.

KEY TO GENERA

A. A normal elongate gillraker in angle of first arch, sometimes 1-2 in front, surface of arch otherwise rough. Angle of preopercle with skinny flap, or expanded, not obtusely rounded. Maxilla usually ends well before eye. Mostly small fishes, rarely exceeding 3 ft., most smaller.
   I. A distinct scaleless skinny flap at angle of preopercle, extending behind level of upper limb. Pectoral tip within half eye diameter of first dorsal origin. Less than 130 scales in lateral line.
      (a) One or two long gillrakers on arch in advance of the one at angle. Less than twenty scales in lateral line to level of dorsal origin, and less than 100 scales in lateral line. Pelvic origin clearly in front of dorsal origin ..... **Sphyraenella nov.**
      (b) Only one long raker in angle of arch, none in front, but some enlarged spinules directed inwards. More than twenty scales in lateral line to level of origin of first dorsal, and more than 105 scales in lateral line. Pelvic origin not in front of dorsal origin. ..... **Indosphyraena nov.**
   II. No marked skinny flap at angle of preopercle, but angle somewhat expanded, forming almost right angle. First dorsal origin well behind pectoral tip, in adults at least an eye diameter behind. More than 130 scales in lateral line. ..... **Australuzza**

B. Outer gill-arch without any normal long gillraker. Angle of preopercle generally obtusely rounded. Maxilla in adults ends close to or below level of front of eye. Mostly attain more than 3 ft., some species much more.
   I. Less than twenty scales from origin of lateral line to level of first dorsal origin, and less than 100 in lateral line. Lateral line median on flank before end of first dorsal. ..... **Agrioposphyraena**
   II. More than twenty scales from origin of lateral line to level of dorsal origin, and more than 100 in lateral line. Lateral line above median on side in front of hind end of first dorsal.
      (a) Tubercles on lower limb of gill-arch each with 1-3 distinct enlarged spiny points. In adults, head one-third of standard length, and eye notably large, 2.1 - 2.5 in postorbital. ..... **Callosphyraena nov.**
      (b) Surface of outer gill-arch rough but without enlarged spiny points. In adults, head usually shorter than one-third of standard length, and eye smaller, 3 or more in postorbital. ..... **Sphyraena**

Genus **Sphyraenella nov.**

Genotype **Sphyraena flavicauda** Ruppell, 1835.

Diagnosis according to the Key to Genera above. Two species known, small fishes of shallow water of the Indo-Pacific.

A. First dorsal spine the longest, not higher than soft dorsal. Dorsal origin just behind tip of pectoral. Distance from tip of depressed first dorsal to origin of second clearly more than snout. ..... **flavicauda**
B. Second dorsal spine longest, markedly higher than soft dorsal. Dorsal origin through or slightly in front of pectoral tip. Distance from tip of depressed first dorsal to origin of second dorsal less than snout. ..... **chrysotaenia**

Sphyraenella flavicauda (Ruppell), 1835

(Plate I, fig. 1)

Probable synonyms are : **Sphyraena brachygnathus** Bleeker, 1854; **langsar** Bleeker, 1854; **grandisquamis** Steindachner, 1866. Names of inadequate definition which have been applied probably to this species are : **chinensis** Lacepede, 1803; **obtusata** Cuvier, 1829; **commersonii** Cuvier, 1829.

D V+I 9. A II 8-9. P 2,10,1. L.1. 80-88. Tr between soft dorsal and anal about 6+1+8. About six across cheek. About twenty predorsal scales, extend to above hinder third of preopercle.

In percentage of standard length : Total length 116, depth 13-14.5, head 33.3, eye 6-6.4, interorbital equals eye; snout 14-14.5; postorbital 11.5-12.8, pectoral 11, pelvic 9, peduncle depth 5.5-6, base first dorsal, equals base of second, 9; first dorsal spine 8.5-9.8, second 7-8.5, height of soft dorsal 10.5-11.5; base of anal 9; Snout tip to : pectoral origin 32, pelvic origin 37, origin of first dorsal 43-45, of second dorsal 69-71, of anal 71-72.

A distinct skinny flap at angle of preopercle, free from scales. A long raker, spinose within, at angle of arch, and in front one on lower limb; seven low spiny tubercles in advance of this. The maxilla reaches below a pupil width before eye. Six or seven larger teeth on hinder part of lower jaw, irregularly vertical or inclined slightly back or forward. Palatine with 8-10 teeth, only 2-3 in front enlarged. The tongue narrowly rounded, with longitudinal bands of fine asperities, joined to floor of mouth by median membrane. The lateral line is only slightly curved from shoulder to caudal, bends down above anal. The first dorsal slightly lower than the second, inserted above or slightly behind the tip of the pectoral and behind the pelvic base. Pelvic

origin slightly behind middle of pectoral length. Anal origin below front fourth of second dorsal. Hindmost ray in soft dorsal and anal somewhat extended. The first dorsal spine longest, distinctly less than postorbital part of head. Distance from tip of depressed first dorsal to origin of second dorsal longer than snout. The interorbital slightly convex, with two slight subparallel median ridges to snout.

Colour: Silvery; back iridescent green, darker above. Lateral line brown yellow. A 1½ scales wide darkish golden stripe from eye to caudal, 2-3 scales below lateral line anteriorly, partly on L.1. on peduncle. Iris golden silvery. Fins with yellowish tinge, caudal lobes with dark edge, median rays dusky yellow.

Described from two specimens; one 265 mm. length from Pinda (14°S), the other 310 mm. length, from Palma (11°S), in Mozambique. Often confused with the closely related and sometimes more abundant **chrysotaenia** Klunzinger, 1884 so that its true distribution is not known, but it is likely to range from Africa to the central tropical Indo-Pacific. We have found it as far south as Great Fish Point (30°30'S), ranging along the whole East African coast, at Pemba, Zanzibar and Seychelles.

Sphyraenella chrysotaenia (Klunzinger), 1884

(Plate I, fig. 2)

Synonym: **Sphyraena aureoflamma** Seale, 1909. Apparently often identified and described as **obtusata** Cuvier, 1829.

D V+I 9. A II 8. P 2,12. L.1. 85-87. Tr between soft dorsal and anal about 7+1+10. About six series across cheek. About twenty-five scales predorsal, scaling to barely above hind margin of preopercle.

In percentage of standard length: Total length 114-118, depth 17, head 33, eye 5.8-6, interorbital 5.5, snout 14, postorbital 11-11.5, pectoral 12.6-13, pelvic 12.3, peduncle depth 8-8.5, base first dorsal 10, of second dorsal 10, base of anal 9.3, first dorsal spine 10, second dorsal spine 13.5-15; height of soft dorsal 10-11. Snout tip to origin of: pectoral 30-31, pelvic 38-40, first dorsal 42, second dorsal 68, anal 70.

A distinct skinny flap at angle of preopercle, free from scales. A long raker, strongly spinose within, at angle of arch and another in front; before this 8-9 low spinose tubercles. The maxilla extends to within a pupil width before eye. 7-8 slender larger teeth on hind part of side of lower jaw inclined slightly backwards. Two front teeth on palatine enlarged, behind these numerous small teeth in a single series. The tongue, rather broadly rounded, almost covered with fine longitudinal bands of small asperities, joined to floor of mouth by median membrane. The lateral line almost straight to caudal base, slightly curved anteriorly, bends down at anal. The first dorsal inserted clearly in advance of the pectoral tip, and behind pelvic base.

Pelvic origin below middle of pectoral. Anal origin below front fourth or third of soft dorsal. Hindmost ray in soft dorsal and anal extended. The second dorsal spine longest, considerably longer than postorbital part of head, and higher than second dorsal. Distance from tip of depressed first dorsal to origin of second dorsal considerably shorter than snout. The interorbital slightly elevated, concave in the middle between two low longitudinal ridges that gradually converge to the snout.

Colour: Greenish above, silvery below. The lateral line yellow and a narrow stripe below from eye to caudal. Fins light greenish yellow. Iris yellowish.

Described from two specimens, one 230 mm. in length, from Pinda (14°S) and one 250 mm. in length, from Malindi, Kenya (3°S), found also in Delagoa Bay, Durban and one juvenile from East London. Previously reported only from the Red Sea, and the Philippines (Seale 1909), but it has clearly often been confused with **flavicauda** Ruppell, 1835 (i.e. **obtusata** Cuvier, of most authors) and almost certainly occurs over a wide range. Now positively recorded from a wide area of the Western Indian Ocean. Alive is easily distinguished from **flavicauda** by its appearance, and in characters by the deeper body, the markedly longer second dorsal spine, longer pectorals and pelvics, and the dorsal origin is clearly in advance of the pectoral tip. Both Day 1878 and Weber and de Beaufort 1922 have clearly described as **obtusata** Cuvier, a mixture of **flavicauda** Ruppell, and **chrysotaenia** Klunzinger.

Genus **Indosphyraena nov.**

Genotype **Sphyraena africana** Gilchrist & Thompson, 1909. Diagnosis according to Key to Genera above. A single small species of shallow water of the Indo-Pacific, penetrates notably far south in Southern Africa.

Indosphyraena africana (Gilchrist & Thompson), 1909

(Plate I, fig. 3)

Synonym: **Sphyraena natalensis** von Bonde, 1923. Names of inadequate definition applied to this species are: **japonica** Cuvier, 1829 and probably **acutipinnis** Day, 1878 and **waitii** Ogilby, 1908.

D V+I 9. A II 8. P 2,12. L.1. 114-125. Tr. between soft dorsal and anal 10+1+11-12. About 11-12 series across cheek. About 33-35 irregular series of predorsal scales, reach to above hinder third of preopercle.

In percentage of standard length: Total length 115 (116), depth 12.4 (12), head 33-35 (36), eye 4.7-5.5 (6.5), snout 14-15 (15.2), postorbital 12.4 (13.6), pectoral 11-12.4 (11), pelvic 8-9 (9), peduncle depth 6.5 (6.6), base first dorsal, equals second 9.5, base of anal 8, first dorsal spine 9-9.5 (10), anal 72-73 (72). Figures in brackets are of specimens 60-140 mm. total length, the others of larger fishes to 300 mm.

A distinct skinny flap at angle of preopercle, free from scales, forming a notch above with preopercle margin. Feebly spinate low knobs on upper surface of gill arch. One long raker, spiny within, at angle of

arch; in front of this are 12-13 feebly distinct low spiny knobs, each with 2-3 larger spinules directed inwards, and on the front third of the arch there are 6-7 indistinct feebly spinate knobs.

The maxilla extends to below half pupil width before eye in young, to below front margin of eye in larger fishes. Juveniles with two, larger fishes with three enlarged teeth in front of palatine, 6-9 smaller teeth behind. Most of teeth on side of lower jaw inclined backwards. The tongue rounded, with fine asperities, joined to floor of mouth by median membrane. The lateral line runs almost straight from shoulder to caudal base, curves down slightly in front. The first dorsal is inserted above or slightly behind tip of pectoral, and above or in advance of origin of pelvic, the latter variable in position, but pelvic base apparently always entirely below dorsal. The tip of the pectoral does not reach beyond the pelvic origin, usually short of it. Anal origin below about end of front third of second dorsal. Hindmost ray of soft dorsal and anal extended. The second dorsal spine, or second and third, longest, shorter than postorbital. Distance from tip of depressed first dorsal to origin of second dorsal about equals snout. The interorbital barely convex, concave medially between two low ridges converging gradually to snout.

Colour : Silvery-grey to greenish on back, fins yellowish, dorsals and caudal with dusky suffusions.

Described from scores of specimens from various localities in the Western Indian Ocean ranging in length from 60-300 mm. total length. This is one of the most abundant and widespread smaller species in the Western Indian Ocean, we found it in almost all areas marginal to land. It is not uncommon in Natal and occasional specimens reach as far south as Mossel Bay (34°S x 22°E).

The original description of **japonica** (Cuvier 1829, also Schlegel 1844) is not definitive and this name is not accepted here. **Sphyraena acutipinnis** Day, 1878 is a mystery, as apparently only one specimen, the type, 20 ins. long, has ever certainly been seen. But for lack of the skinny flap on the preopercle, Day's account and figure agree exactly with my specimens and with those named **japonica** Cuvier. Dr. N. B. Marshall has kindly informed me that Day's type is not in the British Museum. If it exists I should not be surprised if it proves to have the skinny flap and single gillraker of the form described here. If that is so, unless the type of **japonica** can be shown to be this species, it would then be named **acutipinnis** Day. Barnard 1927 recorded **acutipinnis** from Natal, identifying both the type of **africana** G & T, 1909 and that of **natalensis** von Bonde, 1923 as **acutipinnis**, as well as another specimen clearly the same, but I find that both these types have the skinny flap at the angle of the operculum, and agree in every way with the species described here. The earliest certain type available is **africana** Gilchrist & Thompson, and it is proposed to use that name until any earlier may be established, **acutipinnis** Day, 1878 and **waitii** Ogilby, 1908 being possible.

Genus **Australuzza** Whitley, 1947

Genotype **Sphyraena novaehollandiae** Gunther, 1860. Diagnosis according to Key to Genera above : Characteristic elongate slender body and short pectoral ending well before dorsal origin. Up to now, two species have been accepted, the type, from Australia, and **helleri** Jenkins, 1901 from Honolulu. Schultz 1953 (p. 287) described a specimen of **helleri** from the Marshall Islands, Pacific. In his main key Schultz 1953 maintained **helleri** as distinct from **novaehollandiae** chiefly on the grounds that the latter has no long gill-raker on the first arch. I am indebted to Dr. G. P. Whitley for a gill-arch from an Australian specimen of **novaehollandiae**, and the typical long gillraker is present. I can find nothing else in the descriptions of **novaehollandiae** and **helleri** by which they may certainly be distinguished, and here regard them as identical.

Neither species has been reported from the Indian Ocean. During an exploratory coastwise voyage between marginal banks and islands of northern Mozambique, we caught numerous Sphyraenids by trolling. One fish so taken, about 3 ft. in length, unknown to me then, was noteworthy for its bright silvery yellow colour with a yellow stripe along its markedly slender body, and the short pectoral ending well in front of the dorsal origin. My attention was diverted from this fish by stress of weather and later in the day I found that the crew had eaten it. It is my belief that it was this species. To aid identification in our area, a compiled outline is shown here.

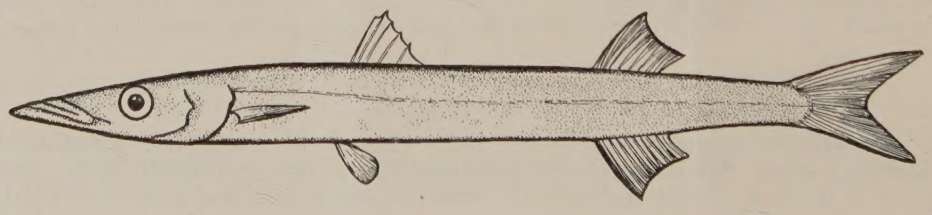

Fig. 1. **Australuzza novaehollandiae**, about 30 inches in length, compiled.

Genus **Agrioposphyraena** Fowler, 1903

Holotype **Esox barracuda** Walbaum, 1792. Diagnosis according to Key to Genera above. A single species which attains a large size, remarkable for distribution in all tropical seas, of evil repute as a man killer. From all others this fish is recognisable at a glance by the colour and markings of body and fins and by the notably larger scales.

Agrioposphyraena barracuda (Walbaum), 1792

(Plate I, figs. 4a, 4b, & 4c)

Synonyms: **Sphyraena picuda** Bloch, 1801; **dussumieri** Cuvier, 1831; **agam** Ruppell, 1835; **snodgrassi** Jenkins, 1902; **akerstromi** Whitley, 1947; **microps** Marshall, 1953.

One of the most easily recognisable species by its characteristic shape, the white tips to the dark dorsal, anal and caudal fins, rarely absent leaden dark blotches on the silvery lower side, the distinct and not too small scales, and by the absence of preopercular flap and gillrakers. We were fortunate to secure specimens ranging from 3-60 inches in length.

D V+I 9. A I 8. P 2,10-11,1. L. l. 75-90. Tr 10+1+9 between soft dorsal and anal. About 25-28 predorsal scales. About 14 across cheek. 16-17 scales in lateral line to below origin of spinous dorsal. No normal gillrakers. No skinny flap on preopercle. 6-7 irregular teeth on palatine. Most teeth on sides of lower jaw vertical, only the hindmost inclined slightly backwards. In the young the maxilla does not reach below eye, with growth reaches further, in large adults to beyond below front margin of eye. Halfway to first dorsal origin the lateral line bends sharply downwards. The first dorsal origin above end of pectoral, and just behind, to well behind, pelvic base, the latter originating under from half-way to two-thirds along pectoral. Growth changes occur, notably decrease in the relative length of the head, and in the insertion of the fins, as indicated by the following table.

Percentage indices of **Sphyraena barracuda.**

Locality	**Shimoni**	**Aldabra**	**Tanga**	**Mahe**	**Providence**	**Wamizi Is.**	**Tambuzi Is.**
	5°S : 39°E	10°S : 46°E	5°S : 39°E	5°S : 56°E	9°S : 51°E	11°S : 41°E	12°S : 41°E
Total length mm.	70	132	182	220	460	1027	1525
Standard length mm.	60	110	150	180	370	900	1345
Depth (percentages)	14	15	15	15	15	14	14
Head	38	37	34	35	33	30	30
Eye	6.5	5.8	5.3	5.2	5	3.6	2.7
Interorbital	4.5	5	5	6.5	6.8	7.5	8
Snout	17	16.5	16	15	15	11.8	11
Postorbital	15	14	12.3	13	13	11.5	12
Pectoral	10	10	11	11	12	11	12
Pelvic	10	10	11	10.5	10	7.5	7.5
Peduncle depth	6.8	7.8	8	8	8	7.5	7.3
Snout tip to:							
1st Dorsal origin	48	45	44	44	44	40	41
2nd Dorsal origin	75	75	72	72	73	67	70
Pectoral origin	37	37	35	35	35	30	29
Pelvic origin	43	41	40	41	40	34	36
Anal origin	73	73	72	73	75	68	71

Colour: General effect leaden-silvery, grading from blue-black above to silvery below. 19-22 rather vague dark crossbars, inclined slightly back and up, equal to interspaces, mostly above lateral line. Variable irregular often angular dark leaden blotches, mostly in silvery areas. First dorsal dusky, also pectoral and central part of pelvic. Soft dorsal and anal black, apex of front lobe and last ray contrasted white. Caudal black, in young apical half of each lobe contrasted white, gradually diminishes with age, first to tips, then whole fin black. The small young are yellowish silvery with large irregular dark blotches across the body. (Plate I, 4a).

We found this one of the most abundant species over most of the Western Indian Ocean, one small specimen from as far south as Durban. It has previously been reported from the Red Sea, Madagascar, Zanzibar, Mauritius, to Philippines, Australia and Central Pacific generally. First known from the Atlantic. Indo-Pacific specimens appear to be indistinguishable from descriptions and illustrations of the Atlantic form.

I have little doubt that **agam** Ruppell, 1835 is this species. Schultz 1953 accepts **agam** as distinct, because he finds about 105 scales in the lateral line of Ruppell's 1835 illustration. My count on that figure is about 90 to caudal base, but the scaling is clearly conventional. In addition, as extra confirmation, Ruppell's figure indicates clearly the characteristic light tips to soft dorsal, caudal and anal. Also, Klunzinger 1870 states that **agam** has 85 scales in the lateral line.

S. microps Marshall, 1953 is almost certainly a large adult of this species, much like figure 4c in Plate I here. The scale count given by Marshall, as well as the scaling on the figure of the type, are apparently not those of the type itself, but were taken from another fish, seen later, and judged identical with the type, but no proof is advanced that it was.

This species attains a large size and is everywhere dreaded for its ferocity, attacking man in the water. Its unenviable reputation in the West Indies is of long standing, and Klunzinger 1884 reports the death of a diver in the Red Sea from bites of this fish (i.e. of **agam** Ruppell). Fresh from the water this species has a peculiar smell. Our Seychellois crew would not eat it, stating that it ate humans. African natives had no such scruples, and we found the flesh excellent. This species was generally close to land, the juveniles often in shallow water.

Genus **Callosphyraena nov.**

Genotype **Sphyraena toxeuma** Fowler, 1904

Diagnosis according to Key to Genera above. Easily recognisable by the shapely fusiform body without contrasted markings, by the relatively large eye, and by the distinct spiny points projecting from the first gill-arch. A single species of the tropical Indo-Pacific.

Callosphyraena toxeuma (Fowler), 1904
(Plate II, fig. 1)

? **Sphyraena forsteri** Cuvier, 1829.

D V+I 9. A II 8 or 9. P 2,11,1. L. l. 110-115. Tr between soft dorsal and anal about 12+1+13. About twelve series across cheek. Predorsal scales anteriorly minute, extend to above hinder third of preopercle. A narrow skinny flap from lower part of angle of preopercle. No elongate gillrakers, lower part of arch with about thirteen low spiny tubercles, each with 1-3 larger spines above. Surface of upper arch rough, no larger spinules. Maxilla reaches half pupil width short of eye in young, close to below eye in adults. Teeth on side of lower jaw small in front, increase posteriorly, the hinder teeth inclined somewhat backwards. On palatine 5-7 rather slender enlarged teeth and a few smaller behind. The tongue, which bears fine asperities, is rather narrowly rounded in front, with median membrane to floor of mouth.

The lateral line virtually straight from shoulder to caudal, slightly undulate on front part to below dorsal origin. The first dorsal origin about above the tip of the pectoral and well behind the pelvic base in young, closer with age. The pelvic insertion below about two-thirds along pectoral. The anal inserted below the front fourth of second dorsal. In the young the hindmost ray in soft dorsal and anal is considerably elongated, about two-thirds length of front rays, less so with age. The interorbital flat, weakly concave in the middle, with two flanging weak longitudinal ridges that converge to the snout. The following table gives the chief dimensions of two specimens.

Locality	**Bazaruto** 21°S : 36°E	**Aldabra** 10°S : 46°E
Total length mm.	405	750
Length body mm.	350	660
Depth (percentages)	14	13
Head	32	33
Eye	5.4	4.8
Interorbital	4.2	5.5
Snout	14.5	16
Postorbital	11	12
Pectoral	9.8	10.6
Pelvic	8.8	8.2
Peduncle depth	6.2	5.6
2nd Dorsal spine	9.8	8.4
Front 2nd dorsal	10	9
Last dorsal ray	5.5	4.4
Snout tip to :		
1st Dorsal origin	40	43
2nd Dorsal origin	70	70
Anal origin	72	74
Pectoral origin	30	32
Pelvic origin	39	41
L. l. to caudal base	115	110

Colour: Silvery black above, grading lighter silvery below, no cross bars. Dorsal, anal and caudal light dusky, darker dorsally. Pectoral darker basally, also on back of fin and on body behind. Iris silvery.

As **forsteri** Cuvier, 1829, previously known from India (Gunther, 1860), the East Indies, and recorded (Fourmanoir 1954) without description from the Comores, now recorded from the Western Indian Ocean, one specimen 405 mm. in length from Bazaruto and several of 700-800 mm. taken by trolling between Seychelles and Aldabra, apparently not abundant.

The original description of **forsteri** (C & V, 1829) is inadequate for definition and that name should be discarded despite its apparent application by many later workers to this species. Gunther 1877 (p. 504, Pl. 119, fig. a) described and figured a fish from Tahiti as **forsteri** Cuvier, that is more like the species previously accepted as **jello** Cuvier, 1829 and quite different from the **forsteri** he described from Calcutta in Gunther 1860. Apparently the first valid name with unmistakable definition and illustration is **toxeuma** Fowler, 1904 based on a specimen 11 ins. in length from Padang, Sumatra.

Genus **Sphyraena** Walbaum, 1792

Genotype **Esox sphyraena** Linn, 1758

Diagnosis according to the Key to Genera above. In view of generic limits here adopted, I am in some

doubt as to whether these remaining Indo-Pacific forms really fall in this genus, whose type is from the Atlantic. A competent revision of world material may well establish that these four species in the Western Indian Ocean merit full generic distinction from **Sphyraena** Linn.

A. Second dorsal and anal black or dark. Maxilla reaches to or below eye.
   I. Subangular cross-bars almost reach ventral profile. Last two rays of anal sharply contrasted white. Spinous dorsal lower than soft. Pelvic origin nearer tip of mandible than anal origin. L.l. 125. ..... **tessera n. sp.**
   II. Cross bars end well above ventral profile. Anal uniform dark. Spinous dorsal as high as soft fin. Pelvic origin midway between tip of mandible and anal origin. L.l. 140. ..... **qenie**

B. Second dorsal and anal greenish or olive. Maxilla reaches almost to eye.
   I. Origin of first dorsal distinctly in advance of pectoral tip and over or close behind posterior margin of pelvic base. Depth of body not less than snout. ..... **jello**
   II. Origin of first dorsal over or just behind pectoral tip, and well behind pelvic base. Depth of body less than snout. ..... **permisca n. sp.**

Sphyraena tessera n. sp.

(Plate II, fig. 6)

Sphyraena qenie (**non** Klunzinger), Schultz 1953, p. 285 (Bikini).

D V+I 9. A I 9. P 2,11-12,1. L. l. pores 125. Tr. 12-13+1+11-12 between soft dorsal and anal, twenty from L. l. to midline of belly. Irregular predorsal scaling extends to above middle of preopercle. About 22-25 scales across cheek.

In percentage of standard length : Total length 120; depth 15, head 27.5, eye 3.8, interorbital 6.1, snout 12.3, postorbital 10.3, pectoral 11.3, pelvic 8, peduncle depth 10.6, base first dorsal, equals second, 8.3, base anal 7.2, second dorsal spine, longest 8.7, height of second dorsal 9.3, last dorsal ray 5.5, height of anal 9, last anal ray 5.2. Snout tip to : first dorsal origin 36; second dorsal origin 67; anal origin 71; pectoral origin 29; pelvic origin 33.

No normal gillrakers, surface of arch finely spinose. No skinny flap at angle of preopercle. Maxilla reaches below front of eye or a trifle beyond. Blunt conical fleshy tip to lower jaw. Palatine with 9-10 formidable teeth, the median largest. Some teeth in side of mandible vertical, others inclined slightly to distinctly backwards. The whole margin of the tongue with closely adjacent patches of fine villiform teeth, 4-5 longitudinal bands of similar teeth along the middle.

The lateral line bends down below origin of first dorsal. The first dorsal origin is well in advance of tip of pectoral and just behind the pelvic base. The pelvic originates slightly more than half-way along below pectoral, markedly nearer tip of mandible than anal origin. The anal inserted well behind second dorsal. Interorbital quite flat and smooth.

Colour : Almost black above, grading lighter below, general impression of tarnished silver. On sides 22-23 black bars, about as wide as interspaces, almost vertical, continued, less intense, below L. l. The two dorsals and caudal uniform dark. Anal dark brown, base lighter, last two rays sharply contrasted white. Pectoral dusky, hind margin light. Four front rays of pelvics dusky, narrowly lighter behind. Iris silvery-yellow, with dusky patches. Inside mouth and toothless areas of tongue dusky.

Not uncommon in the Western Indian Ocean north of 14°S. Described from a specimen 1200 mm. in length taken over deep water near Assumption Island (9°50′S x 46°20′E). Also taken between Aldabra and Africa (about 45°E), and in the area about Palma (11°S x 40°20′E). The type, the photograph shown here, and a head from the 47-inch specimen described above, in this Department.

Clearly identical with mine is a fish from Bikini, Pacific, described as **qenie** Klunzinger, 1870 by Schultz 1953, who pointed out that Klunzinger's 1884 figure showed no white hind rays to the anal, and has eye 5.7 in head, whereas Shultz's fish had eye 7.6 — my specimen shows 7.3. The white hind part of the anal is so conspicuous a feature that it is difficult to believe that Klunzinger would have failed to observe it. Klunzinger's 1884 figure of **qenie** shows only 7-8 rows of scales across the cheek and the pelvic origin as midway between tip of mandible and front fourth of anal. In my fish the pelvic origin is considerably nearer the tip of the lower jaw. I am in some doubt as to whether or not this may be **qenie** Klunzinger, but the description and figure alone of that species are not sufficiently definitive. Only Klunzinger's type, if that exists, can settle this.

Sphyraena qenie Klunzinger, 1870

Renamed **kenie** Klunzinger 1884.

Reported from the Red Sea. The following compiled from Klunzinger 1870 and 1884.

D V+1 9. A 1 9. P 14. L. l. 140. Tr 15+16. In percentage of standard length : head 29, depth 13, eye 5, snout 12.5, postorbital 10, pectoral 10.5, pelvic 10.5, second dorsal spine, longest, 10.5, height of second dorsal 10.5, depth peduncle 6.5; Snout tip to origin of : pectoral 28; pelvic 34; first dorsal 36; second dorsal 65; anal 69.

Body compressed. No preopercular flap. Maxilla reaches below front third of eye. The teeth on side of lower jaw vertical. Chin rather prominent. The lateral line bends down below hind part of first dorsal.

The first dorsal origin is somewhat in advance of tip of pectoral and distinctly behind pelvic base. Second dorsal spine longest, as high as soft dorsal. Pelvic inserted below about the middle of the pectoral, and midway between tip of mandible and front of anal. The anal similar in size and shape to second dorsal, inserted below middle of that fin.

Colour silvery, grey-green above, the dark colour of the back extending as about 20 bars that cross the lateral line, (Klunzinger 1884 states 15 bars). All fins blackish.

Red Sea, stated by Klunzinger to reach 1000 mm. and to be not uncommon in winter. As stated elsewhere, it is doubtful if the species here described as **tessera n. sp.** is not identical with **qenie** Klunzinger, a matter which can scarcely be solved in the absence of Klunzinger's type. There is at least a possibility that **qenie** is identical with **nigripinnis** Schlegel, 1843 from Japan.

Sphyraena jello Cuvier, 1829
(Plate II, figs. 7a & 7b).

The "Jellow" of Russell 1803. Synonym **altipinnis** Ogilby, 1910.

D V+I 9. A II 8. P 2,10-11,1-2, total 14. L.l. to caudal base 128-135 pores. Tr about 14+1+12 between soft dorsal and anal. About 35 irregular series of scales predorsal, extending to above about hind third of preopercle. About 25 series across cheek. Body somewhat compressed. No normal gillrakers, about sixteen low spinose tubercles on lower limb of outer arch.

Body well compressed. Preopercle without skinny flap at angle. Maxilla reaches almost below front of eye. Fleshy papilla at tip of mandible not prominent. Palatine with 5-7 enlarged teeth in front, rarely posterior smaller teeth, then only few. Most teeth on side of lower jaw inclined distinctly backwards. The tongue broadly rounded in front, with fine villiform teeth above. The lateral line has a characteristic dorsally convex curve just before the first dorsal, curving down below that fin. The first dorsal origin clearly in advance of pectoral tip, and over or just behind the pelvic base. Distance between levels of insertion of pelvic and first dorsal fin never more than about one-third of postorbital. The anal inserted variably below the front fourth of the second dorsal to more posterior. Interorbital little elevated, the median part weakly concave. The adipose eyelid at upper part of eye clearly below dorsal profile of head. Dimensional relationships are given below.

Locality	Knysna	Durban	Isipingo	Isipingo	Mjumbi	Tambuzi
	33°S	30°S	30°S	30°S	12°S	11°S
Total length (mm.)	65	230	285	370	710	820
Standard length (mm.)	55	200	240	312	600	700
Depth (percentages)	14	13.5	13.5	13	12.5	12.1
Head	38	33	33	32.2	31	29.9
Eye	6.8	6	5.3	4.8	4.3	3.6
Interorbital	4	4.5	5	5.7	6.5	7.5
Snout	16	14	13.5	14	13.7	13.5
Postorbital	13	12	11.6	11.8	11.7	11.5
Pectoral	12	12	12.2	12.5	12.2	12.5
Pelvic	7	7	7	7.2	7	7
Peduncle depth	6	7	7	7	7	7
1st dorsal spine	–	8	9	9	8.7	8.5
2nd dorsal spine	–	9.5	10	10.3	9.5	9.3
Height 2nd dorsal	–	13.5	14.3	14	13.7	13.7
Snout tip to :						
Pectoral origin	36	31.5	31	31	30.3	30
Pelvic origin	41	39.2	39	39.1	39.2	39
1st dorsal origin	45	41	40	40.7	40	41
2nd dorsal origin	69	68	69	68	70	69
Anal origin	71	71	71.4	71	73	73

Colour : Silvery below and on sides, with yellowish tinge, grading to deep purple or black above, with a number of purple crossbars that extend little below the lateral line, in smaller fishes 10-14 from nape to caudal base, with age there are more but behind the anal they become obscure. The dorsals and caudal dusky to black, more with age, other fins lighter. A 65 mm. fish has four black cross-bars right across the body, the first three narrow, equally spaced, the first before dorsal origin, the second and third between the dorsals, the fourth, twice eye diameter, from below hind half of second dorsal backwards.

We found this species over a wide range of the Western Indian Ocean, mostly close to land. The strikingly banded young sometimes occur in fair sized shoals on shallow banks, and penetrate estuaries. In South Africa this species is not uncommon in Natal and odd strays reach as far south as Knysna, 33°35'S. In tropical waters it is often taken by trolling — we got fish to over 4 ft. in length.

It seems clear that two closely related species have been confused in the name **jello.** One, described above, has the first dorsal origin in advance of the tip of the pectoral and over or just behind the pelvic base. The body is well compressed. This, perhaps the most abundant species in African waters, is clearly the

fish illustrated by Russell 1803 in plate 174 and named by him "Jellow"; it is this on which **jello** Cuvier, 1829 was apparently based. The other related species has the first dorsal origin over or just behind the tip of the pectoral and well behind the pelvic. The body is cylindrical, little compressed. This has up to now apparently been confused by most workers with, and accepted as, **jello,** Cuvier, 1829, this being due probably to Cuvier's description, which states that the dorsal and pelvic are "advanced opposite the end of the pectoral, as in **barracuda."** In Cuvier's own illustration of **barracuda** however the first dorsal is inserted well in advance of the pectoral tip, and not over or behind it, as has been somewhat arbitrarily accepted as diagnostic of **jello**, (Cuvier shows the pelvic of **barracuda** as entirely below the dorsal, which it apparently never is). Were it not that Cuvier clearly based his species **jello** on Russell's 1803 illustration, the name **jello** Cuvier, could well be discarded, since his description is not distinctive between the two closely related forms defined here.

In so far as I can determine, the only later author to describe the true **"jellow"** or **jello** is Ogilby, who, misled by the common diagnosis of **jello,** named his fish **altipinnis,** but unfortunately gave no illustration. The species which has hitherto passed under the name of **jello** is described below as **permisca n. sp.**

The fish which I illustrated as **Sphyraena japonica** Schlegel (Smith 1949, fig. 896), a mounted specimen in the Museum at Lourenco Marques, falls here. In the mounted fish the front of the body has been distorted to pull the pectoral unnaturally forward.

If Cuvier's type of **jello** exists and if it should prove to be identical with the species for which the name **jello** has long been accepted, i.e. not the "Jellow" of Russell, and here named **permisca n. sp.,** the latter would become a synonym of **jello** and the species described here as **jello** would become **altipinnis** Ogilby.

Sphyraena permisca n. sp.

(Plate II, fig. 8).

Described as **jello** Cuvier, 1829 by Gunther, 1860; Klunzinger 1870 and 1884; Jordan & Seale 1906; Weber & de Beaufort 1922; Fowler 1928; Schultz 1953 and others.

D V+I 9. A II 8. P 2,10,2. L. 1. with 130 pores to caudal base. Tr about 13+1+15 between soft dorsal and anal. Predorsal scaling irregular, about forty series extending to near above middle of preopercle. Body little compressed. No normal gillrakers, about fifteen low finely spinose knobs on surface of lower limb of outer arch.

In percentage of standard length : Total length 118, depth 12.4, head 31.3, eye 5.8, interorbital 5.8, snout 13.5, postorbital 11.3, pectoral 10.5, pelvic 9, peduncle 6.5, first dorsal spine 6.7, second dorsal spine 8.6, second dorsal height 14.1; Snout tip to : pectoral origin 29.5; pelvic origin 36.3; first dorsal origin 41; second dorsal origin 69; anal origin 71.

Body cylindrical, little compressed. No skinny flap at angle of preopercle. Maxilla reaches almost below front of eye. Symphyseal knob not prominent. On one side three, on the other five enlarged teeth on front of palatine, a few teeth grading smaller behind. The tongue rather acute, bent down at the sides (as preserved), the surface with fine asperities.

The lateral line runs almost straight from shoulder to caudal, there being only a slight convexity in advance of the first dorsal. The first dorsal originates just behind the tip of the pectoral and well behind the pelvic base, the distance between the origins of dorsal and pelvic about half postorbital length. The interorbital largely gently concave, with sub-parallel low ridges to snout. Edge of upper part of adipose eyelid almost in dorsal profile.

Colour : Preserved, light brown below, darker above, with fourteen short dark cross-bars from nape to caudal base, not extending below the lateral line. The dorsals dusky, caudal less so, paired fins light.

Described from the type, a single specimen 320 mm. in length, from Bazaruto, in this Department. This fish clearly differs from the true "Jellow" and accords with numerous descriptions and illustrations of fishes malidentified as **jello** Cuvier. We found only one specimen in the course of our work. It appears to be more abundant in the Eastern Indian Ocean and the Pacific.

BIBLIOGRAPHY

BLEEKER 1854, Natuur. Tijdskr. Ned. Ind. VII.

BLOCH 1801, Atl. Ich. (fig.).

CUVIER 1829, Hist. Nat. Poiss. VII.

CUVIER 1831, Hist. Nat. Poiss. VII.

DAY 1878, Fishes India (fig.).

FOURMANOIR 1954, Mem. Inst. Sci. Mad. IX.

FOWLER 1903, Proc. Ac. Nat. Sci. Phil. LV.

FOWLER 1904, Journ. Ac.Nat. Sci. Phil. XII (fig.).

FOWLER 1928, Mem. Bish. Mus.

GILCHRIST & THOMPSON 1909, Ann. S.A. Mus.VI. (fig.).

GUNTHER 1860, Cat. Fish. B.M. III.

GUNTHER 1877, Fische. Sudsee. II.

JENKINS 1901, Bull.U.S. Bur. Fish. XIX. (fig.).

JENKINS 1902, Bull. U.S. Fish. Comm. XXII (fig.).

JORDAN and SEALE 1906, Bull. Fish. Washington, XXVI.

KLUNZINGER 1870, Syn. Fische. Roth. Meer.

KLUNZINGER 1884, Fisch. Roth. Meer. (fig.).

LACEPEDE 1803, Hist. Nat. Poiss. V.

LINN 1758, Syst. Nat. ed. X.

MARSHALL 1953, Dep. Harb. Mar. Queensland, No. 2 (fig.).

OGILBY 1908, Ann. Queensland Mus. No. 9, Pt. 1.

OGILBY 1910, Proc. Roy. Soc. Queensland, XXIII.

RUPPELL 1835, Neue Wirbel. (Red Sea).

RUSSELL 1803, Fishes Viz. (fig.).

SCHLEGEL 1843, Fauna Japonica. (fig.).

SCHULTZ 1953, U.S. Nat. Mus. Bull. 202, I.

SEALE 1909, Philippine J. Sci. Manila A Gen. Sci. 4 p. 502.

SMITH 1949, Sea Fishes S.A. (fig.).

STEINDACHNER 1866, Sitz Ak. Wiss. Wien 1866 VIII p. 446.

WALBAUM 1792, P. Artedi s. gen. pisc. Ich.

WEBER and DE BEAUFORT 1922, Fish. Ind. -Aus. Archip. IV.

WHITLEY 1947, Austr. Zool. XI No. 2.

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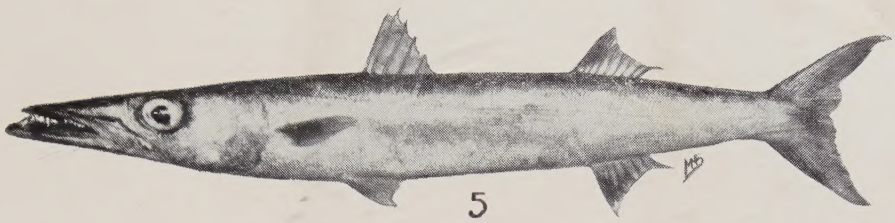

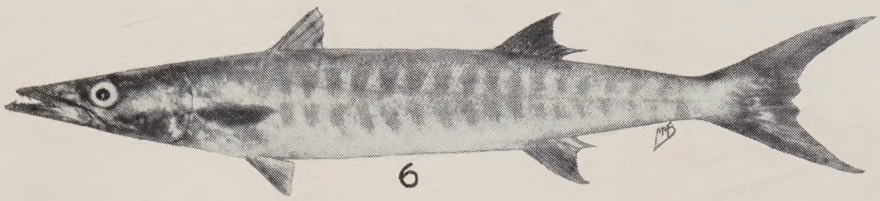

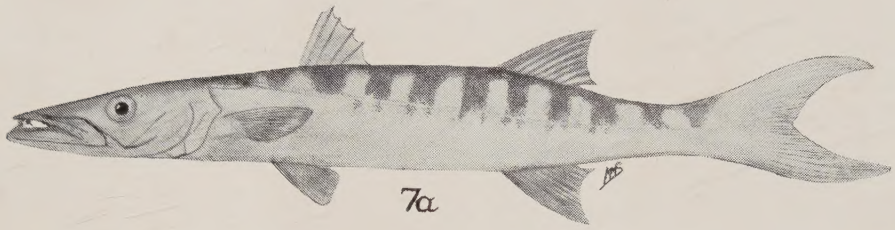

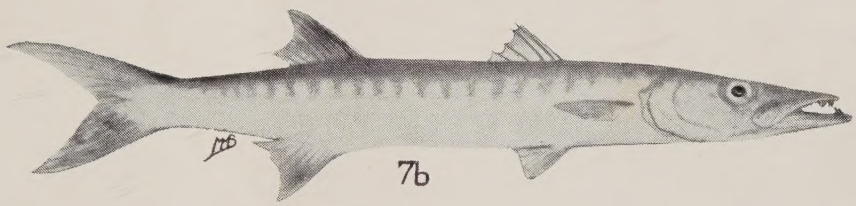

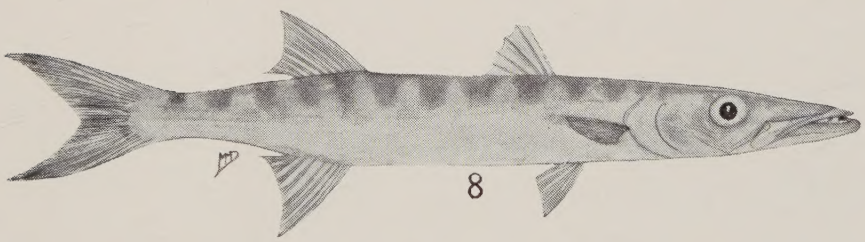

PLATE II.

5.—Callosphyraena toxeuma, 740mm. **6.—Sphyraena tessera,** 1200mm.
7a.—**Sphyraena, jello,** 380mm; b. 710mm **8.—Sphyraena permisca,** 320mm